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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,162	10/14/2003	Anurag Mittal	2002P17242 US01	4275

7590 08/09/2007

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EXAMINER	
MOTSINGER, SEAN T	
ART UNIT	**PAPER NUMBER**
2624	
MAIL DATE	**DELIVERY MODE**
08/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/685,162	MITTAL ET AL.
	Examiner	**Art Unit**
	Sean Motsinger	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *3/19/2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1,2 and 25* is/are allowed.

6)☒ Claim(s) *3-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/8/2003* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Applicants Arguments

1. The amendment to the claims filed on 3/19/2007 has been entered and made of record.

Objection to the Drawings:

2. Applicant has traversed the objection to the drawings, however, applicant's arguments are not persuasive. Applicant has argued using text from form paragraph 6.22.01 in M.P.E.P. section 608.02(d). The examiner in the objection to the drawings did not use this form paragraph. This paragraph applies to detail described in the specification and makes no reference to claimed subject matter. Therefore this paragraph is clearly not relevant.

3. The applicant also argues that section 601.01(f) of the M.P.E.P. states that a drawing for a method claim "is not necessary for the understanding of the invention under 35 U.S.C. 113 (first sentence)." Examiner has not made a rejection under 35 U.S.C. 113 and therefore this does not appear to be relevant.

4. 37 CFR 1.83 (a) states clearly "The drawings in a non-provisional application must show every feature specified in the claims." The rule does not provide for any exceptions. Any future response other then an amendment adding all of the features not shown, or an argument clearly stating where the features listed in the objection can be found in the drawings will be considered intentionally non-responsive.

Rejections of Claims:

5. Re claims 3-5, applicant has amended claim 3 to state that his higher dimensional space includes at least one flow dimension and one color dimension (as interpreted by the examiner in view of the 112 rejection below.) Applicants argues this is allowable with respect to examiners inclusion or allowable subject matter in the previous action. However examiners allowance was in reference to a probability distribution having 3 color components and 2 flow components. This claim does not claim a probability distribution but only claims that the higher dimensional space includes a color dimension, and an optical flow (a measurement of movement) dimension. Therefore any space that accounts for movement has "optical flow dimensions."

6. Re claim 6-10, applicant has amended claim 6 to include having a substantially dynamic background such as a naturally occurring outdoor environment, and provided an argument stating that this amendment makes the claim patentable over the prior art. However, applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. Applicant only describes differences in applicant's dynamic background and Lee's dynamic background. There is no argument with regard to how Lee's is not "substantially dynamic" only to how it is not "substantially continually dynamic," and applicants example of a type of dynamic

background is only an example and is not given patentable weight. Therefore the rejections to claims 6-10 are being maintained despite the amendment.

Objections to the Drawings

7. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following features must be shown or the feature(s) canceled from the claim(s). In Claim 3 "evaluating uncertainties," and "combining said optical flow measurements, said intensities, and said uncertainties." In claim 4, "applying an error function," "applying an optical flow constraint," "deriving a motion estimate," and "comparing said motion estimate." In claim 6 "deriving flow covariance matrices," "deriving intensity covariance matrices," "applying relevance criteria," and "performing detection." In claim 10 "applying an optical flow constraint," "applying an error function" "deriving amotion estimate," "comparing said motion estimate," "deriving covariance matrices," "performing optimized detection," evaluating uncertainties," and "combining said optical flow measurements, said intensities, and said uncertainties". In claim 11 "a joint 5-dimensional space comprising 3 color components and 2 flow components." No new matter should be entered.

8. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the

immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Rejections Under 35 U.S.C. 112 Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> **The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

9. Claims 3-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Re claim 3-5 Applicant claims a "higher dimensional space which includes an optical flow component and a normalized color component." It is not clear how in a "higher dimensional space" a "component" is a "dimension" or how a normalized color. For the purposes of examination examiner will interpret the claim to read "...higher dimensional space which includes an optical flow dimension and a color dimension."

11. Re claim 6, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). For the purpose of examination examiner has interpreted the claim not to include this limitation.

12. Re Claims 11-13 these claims are now indefinite because of confusion generated by the amendment/arguments in regard to claim 3. Examiner previously believed that claim 11 intended to claim the probability distribution to contain 3 color components and 2 flow components. However now it is unclear if the components refer to the "probability distribution" or to the "5-dimensional space". For the purpose or examination examiner will examine under the assumption that the probability distribution comprises 3 color components and 2 flow components.

Rejections Under 35 U.S.C. 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claim 3-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee US PGPUB 2003/0058237 in view of Simoncelli, Eero, "Bayesian Multi-Scale differential Optical flow" *Handbook of Computer Vision and Applications*, Academic Press, Vol. 2 pp. 397-422.

14. Re claims 3-6 Lee discloses a method for dynamic scene modeling and change detection applicable to motion analysis, comprising the steps of: making measurements of optical flow (see paragraph 69 line 8) and intensities (paragraph 20 lines 6-7 RGB information is intensities) for said dynamic scene(see paragraph 6 line 11 if objects are moving the scene is dynamic); utilizing said optical flow measurements for capturing (i.e. detecting paragraph 69 line 7) and modeling (model maintenance paragraph 69 line 4) the dynamics of said scene (paragraph 71 lines 5-8 this section describes modeling movement which is the dynamics of the scene); evaluating uncertainties in said measurements (see paragraph 39 a covariance is a measure of uncertainty); and combining said optical flow measurements (see paragraph 69 lines 3-9 the model is maintained based on optical flow), said intensities (see paragraph 39 the pixels modeled in the RGB color

space (i.e. using intensities)), and said uncertainties (of intensity) (see paragraph the pixels are also modeled via covariance (i.e. uncertainty)) so as to develop a robust (see paragraph 69 this model can handle movement and therefore is robust) representation (model see paragraph 69 line 2) of said scene (background paragraph 69 line 2) in a higher dimensional space (see paragraph 69 line 4 The background has multiple layers and therefore is higher dimensional) which includes an optical flow dimension (paragraph 69 shows that optical flow is used in the model therefore has an "optical flow dimension") and a color dimension (see paragraph 39). Lee does not disclose derive a figure of uncertainty (covariance is a figure of uncertainty page 410 1rst paragraph) for optical flow measurement data. However, Simoncelli discloses deriving a figure of uncertainty (covariance is a figure of uncertainty page 410 1rst paragraph) for optical flow measurement data. The motivation to combine is to take advantage of using a "efficient" gradient approach while allowing for more then "small displacements" when calculating optical flow, see page 398 paragraph 2. Therefor it would have been obvious to one of ordinary skill in the art to modify the invention of Lee with Simoncelli to reach the aforementioned advantage.

15. Re claim 4 Simoncelli further discloses wherein said step of evaluating uncertainties in said measurements comprises the steps of: applying an optical flow constraint equation (equation 14.1 page 398) at a given point defined by a spatial location and time (page 398 last paragraph) to obtain respective constraints;

applying an error function (page 399 second paragraph) to combine said respective constraints from each said given point (page 398 second paragraph) within a defined region for deriving a characteristic function(equation 14.3 page 399) ; deriving a motion estimate(velocity estimate 4th paragraph page 399) from said characteristic function; and comparing said motion estimate with a given uncertainty model (covariance information page 410 1rst paragraph) so as to derive a figure of uncertainty (indicate more uncertain vectors page 410 1rst paragraph) for optical flow measurement data.

16. Re claim 5, Simoncelli further discloses wherein said figure of uncertainty (page 400 4th paragraph) exhibits a Gaussian characteristic (page 401 paragraph 2).

17. Re claim 6 Lee discloses a method for dynamic scene modeling and change detection applicable to motion analysis, comprising the steps of: deriving optical flow measurement data for a dynamic scene (Paragraph 69 line 9) having a substantially dynamic background (paragraph 70 note the background is moving) such as naturally occurring outdoor environmental conditions (note this appears to be an example and not given patentable weight); deriving intensity (RGB information) data for said dynamic scene (paragraph 20 lines 5-8); deriving intensity covariance matrices for said intensity data (paragraph 39 line 3); applying relevance criteria (training see paragraph 57 line 1) to said intensity covariance matrices (paragraph 57 line 5 note the parameters of the model included covariance matrices) for

selecting relevant features (parameters paragraph 57 line 4) of a subset thereof; and combining said relevant features (into a trained model paragraph 57 line 5) of said subset for performing detection (background foreground segmentation paragraph 52). Lee does not disclose, Deriving flow covariance matrices for said optical flow measurement data; applying relevance criteria to said flow covariance matrices for selecting relevant features of a subset thereof and combining said relevant features of said subset for performing detection. However Simoncelli discloses deriving flow covariance matrices for said optical flow measurement data (paragraph 3 page 401); applying relevance criteria (uncertainty of vectors page 410 first paragraph) to said flow covariance matrices for selecting relevant features (uncertainty of vectors page 410 first paragraph) of a subset thereof and combining said relevant features of said subset for performing detection (these features are used for optical flow which is used in detection of background layers of Lee paragraph 69). The motivation to combine is to take advantage of using a "efficient" gradient approach while allowing for more then "small displacements" when calculating optical flow, see page 398 paragraph 2. Therefor it would have been obvious to one of ordinary skill in the art to modify the invention of Lee with Simoncelli to reach the aforementioned advantage.

18. Re claim 8 Lee further discloses wherein said step of combining said relevant features comprises detection at a particular pixel (note the segmentation is preformed on each pixel paragraph 52 line 2).

19. Re claim 9 Simoncelli further discloses wherein said step of deriving optical flow measurement data comprises applying the Simoncelli algorithm (see title and author.)

20. Re claim 10 Simoncelli further discloses, wherein said step of deriving optical flow measurement data comprises the steps of: applying an optical flow constraint equation (equation 14.1 page 398) at a given point defined by a spatial location and time (page 398 last paragraph) to obtain respective constraints; applying an error function (page 399 second paragraph) to combine said respective constraints from each said given point (page 398 second paragraph) within a defined region for deriving a characteristic function(equation 14.3 page 399) ; deriving a motion estimate(velocity estimate 4th paragraph page 399) from said characteristic function; and comparing said motion estimate with a given uncertainty model (covariance information page 410 1rst paragraph) so as to derive a figure of uncertainty (covariance is a figure of uncertainty page 410 1rst paragraph) for optical flow measurement data; deriving flow covariance matrices for said optical flow measurement data (paragraph 3 page 401); evaluating uncertainties in optical flow measurements (indicates uncertain vectors page 410 paragraph 1.) While lee further discloses, deriving intensity covariance matrices for said intensity measurement data (see paragraph 39); evaluating uncertainties in said intensity measurements (see paragraph 39 a covariance is a measure of uncertainty.) combining said optical flow measurements (see paragraph 69 lines 3-9 the model is maintained based on

optical flow), said intensities (see paragraph 39 the pixels modeled in the RGB color space (i.e. using intensities)), and said uncertainties (of intensity) (see paragraph the pixels are also modeled via covariance (i.e. uncertainty)) so as to develop a robust (see paragraph 69 this model can handle movement and therefore is robust) representation (model see paragraph 69 line 2) of said scene (background paragraph 69 line 2) in a higher dimensional space (see paragraph 69 line 4 The background has multiple layers and therefore is higher dimensional).

21. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Simoncelli and Lee as applied to claim 6 above, and further in view of "Statistical modeling and performance characterization of a real-time dual camera surveillance system" Greiffenhagen, M.; Ramesh, V.; Comaniciu, D.; Niemann, H.; Computer Vision and Pattern Recognition, 2000. Proceedings. IEEE Conference on Volume 2, 13-15 June 2000 Page(s):335 – 342.

22. Re claim 7, Lee and Simoncelli discloses all of the features of claim 6. They do not disclose wherein said step of deriving intensity covariance matrices comprises a step of deriving covariance matrices of normalized color representation. However Greiffenhagen discloses wherein said step of deriving intensity covariance matrices comprises a step of deriving covariance matrices (in page 3 column 1 first paragraph 2 line 15) of normalized color representation (illumination invariant in page 3 column 1 first paragraph 2 line 15). The motivation to combine found in page 3 column 1 first

paragraph is to "handle shadowing and illumination changes." Therefore one of ordinary skill in the art would find it obvious to combine Griffenhagen with Lee and Simoncelli to reach the aforementioned advantage.

Allowable subject Matter

23. Allowable subject matter, claims 1-2 and 25 are allowed. Claims 1 and 25 are allowable because the prior art does not include adding said current input to said image background model with a low probability whenever said probability is below said threshold. Claim 2 contains allowable subject matter because it depends from claim 1.

24. Claim 11 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action. Claim 11 contains allowable subject matter because while Lee show discloses a probability distribution containing 3 color components and Simoncelli discloses a distribution with 2 flow components they are not in a joint 5-dimenstional space. Therefore the prior art does not show a probability distribution of said intensity and said optical flow in a joint 5-dimensional space comprising 3 color components and 2 flow components. Claims 12-13 contain allowable subject matter because the depend from claim 11

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean Motsinger whose telephone number is 571-270-1237. The examiner can normally be reached on 9-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571)272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Motsinger

5/18/2007

JINGGE WU
SUPERVISORY PATENT EXAMINER